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- Lie, William K.  
Methuen, MA 01844 (US)
- Dionne, Edward P.  
South Paris, ME 04281 (US)

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(71) Applicant: MALDEN MILLS INDUSTRIES, INC.  
Lawrence, Massachusetts 01841 (US)

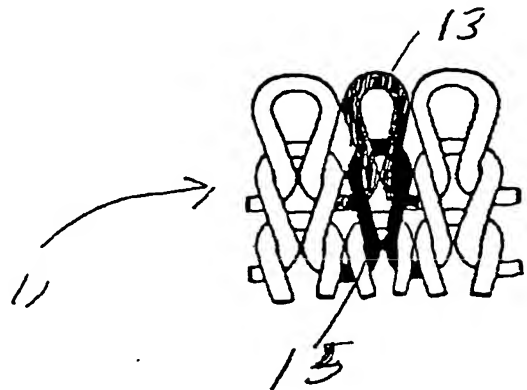
(74) Representative:  
Cropp, John Anthony David et al  
MATHYS & SQUIRE  
100 Grays Inn Road  
London, WC1X 8AL (GB)

(72) Inventors:  
• Rock, Moshe  
Andover, MA 01810 (US)

(54) Two face terry knit raised surface fabric with face to back color differentiation

(57) A raised surface fabric knit on a conventional terry knitting machine is provided. The process utilizes yarns of different colour or dyeability in alternating courses; by way of example, yarn 15 (undyed) is used for course 1, yarn 13 (dyed) is used for course 2, yarn 15 is used for course 3 yarn 13 for course 4, etc. Yarn 15 has a low shrinkability, while yarn 13 has a high shrinkability.

Fig 2



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## Description

### BACKGROUND OF THE INVENTION

[0001] This invention relates to a raised surface fabric which is knit on a standard terry knitting machine, and more particularly, to a terry knit raised surface fabric in which the color on the technical face is differentiated from the color on the technical back.

[0002] In general, knitted terry fabrics are a variation of a jersey knit fabric whereby two yarns are fed simultaneously into the same needles. A plaiting technique is employed to knit the fabric which causes one yarn always to appear on the technical face, and the other yarn always to appear on the technical back. As the fabric is knitted, sinker loops are formed of one yarn, leaving the other yarn to serve as the ground. Knitted terry is produced in weights ranging from those suitable for robes and beach wear to various types of fashion apparel.

[0003] It is also well known to incorporate two different yarns in a fabric product, each having different shrinkage properties or different dyeability properties. Reference is made to U.S. Patent No. 3,030,691, which describes a terry fabric with a base having terry loops projecting from both faces thereof. The terry loops are formed of two or more types of yarns of varying shrinkability. They are arranged such that the loops formed of at least one of the types of yarns project from the face of the base, and loops formed of at least one of the other types of yarns project from the opposite face of the base. As a result, the opposite faces of the produced fabric are of a different appearance.

[0004] It is also well known to produce a terry fabric having a high-low pile. Reference is made to U.S. Patent No. 3,721,272, in which the terry fabric described therein has a base with terry pile yarns arranged in a predetermined pattern of high and low pile areas on each side of the base. The high pile areas are formed from cotton terry yarns, and the low pile areas are in the form of terry loops formed of rayon terry yarns.

[0005] In all knit fabrics produced with a three-dimensional high-low effect, the pattern produced requires the use of a special knitting machine in order to achieve the desired effect.

[0006] Accordingly, it would be desirable to provide a raised surface fabric which is knit on a standard terry knitting machine with a high-low effect such that the color on the face of the fabric is different than the color on the back of the fabric after the application of heat.

[0007] It is thus an object of an aspect of the invention to provide a raised surface fabric knit on a standard terry knitting machine in which different colors are produced on the technical face and on the technical back.

[0008] Another object of an aspect of the invention is to provide a raised surface fabric knit on a standard terry knitting machine utilizing different loop yarns in alternating courses.

[0009] A further object of an aspect of the invention is

to provide a raised surface fabric knit on a standard terry knitting machine utilizing yarns with differing shrinkages.

[0010] Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the following description.

[0011] Generally speaking, in accordance with the invention, a raised surface fabric, knit on a conventional terry knitting machine utilizing a reverse plaiting technique, is provided. In conventional fabrication, the same loop yarn is used, and thus the fabric color is the same on both the face and the back. Here, the process utilizes yarns of different color or dyeability in alternating courses; by way of example, yarn A (undyed) is used for course 1, yarn B (dyed) is used for course 2, yarn A is used for course 3, yarn B for course 4, etc.

[0012] Significantly, yarn A has a lower shrinkability than yarn B which preferably has a very high shrinkability. Thus, when heat is applied to the terry knit fabric, during dyeing or during another process step, the loops of yarn B will shrink to a small fraction in size as compared to the loops of yarn A. As a result, when the technical back of the fabric is raised, the color of yarn A will predominate. In contrast, even upon raising of the technical face, since no loops are formed on the technical face, the color produced is a blend of the colors of yarns A and B.

[0013] The invention will now be described in greater detail with reference to a preferred embodiment of the invention and with the aid of the accompanying drawings in which:

FIG. 1 is a perspective view of a terry fabric construction according to the invention viewed from its technical back and illustrating formation of the sinker loops.

FIG. 2 is a front elevational view of the terry fabric construction of FIG. 1 viewed from its technical face;

FIG. 3 is a side view showing the terry loops of the fabric construction of FIG. 1 prior to application of heat; and

FIG. 4 is a side view of the terry loops of the fabric construction after the application of heat.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] Referring now first to FIGS. 1 and 2, a raised surface fabric made in accordance with the invention is generally indicated at 11. Fabric 11 includes alternating courses of different colored loop yarns 13 and 15 integrated with stitch or backing yarn 17. As can be appreciated, loop yarns 13 and 15 are plaited around stitch yarn 17. Fabric 11 comprises a circular knit reverse plaited construction which is suitable for generating a two face raised surface fabric produced through napping, brushing, sanding or other types of "raising" processes.

[0015] Significantly, alternating loop yarn 13 is made from a high shrinkage material, while alternating yarn 15 is made from a low shrinkage material. High shrinkage yarn 13 may be a texturized or flat filament yarn, while low shrinkage yarn 15 may be a flat filament or spun yarn. Yarns 13 and 15 may be made from any natural material, or from rayon, acetate, polyester, acrylic or nylon. Stitch yarn 17 may be made from polyester or nylon, and may include up to 75% Spandex.

[0016] Once fabric 11 is produced, heat is applied thereto, either during dyeing or as part of some other process step. Typically, the heat may be applied at a temperature of at least 93°C (200°F) for a time sufficient to produce shrinkage of yarns 13. As a result of this application of heat, loops of yarn 13 will shrink to a small fraction in size as compared to the loops of yarn 15.

[0017] Thereafter, the technical back of fabric 11 may be raised by either a napping, brushing or sanding process such that only the color of yarn 15 will be visible. This is because of the shrinkage characteristics of yarns 13 and 15, as described above. On the other hand, raising the technical face will produce a blend of colors of yarns 13 and 15 since the technical face does not include any sinker loops. Neither yarn 13 or 15 predominates on the technical face.

[0018] Yarn 13 preferably has a shrinkability of between about 10 and 60 percent, whereas yarn 15 preferably has a shrinkability of between 0 and 10 percent. Importantly, yarn 13 ideally should have at least 10% greater shrinkability than yarn 15.

[0019] Reference is now made to FIGS. 3 and 4. FIG. 3 shows the general structure of the technical back of fabric 11 prior to exposing the fabric to heat, while FIG. 4 shows the technical back of fabric 11 after exposing it to heat. As can be appreciated, the technical back of the fabric shown in FIG. 4 has a three-dimensional construction of high-low courses.

[0020] In an alternative form, not shown, the knit construction of the inventive fabric may be modified from solely a knit stitch construction to a construction which includes both knit stitch and tuck stitch. As a result, there is an enhanced capability to control the face to back colour differentiation since on the technical face of the inventive fabric, the tuck stitch yarns will be raised or napped substantially less than the knit stitch yarns, producing even greater colour differentiation.

[0021] It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained, and, since certain changes may be made in the invention without departing from its spirit and scope, it is the following claims which define the inventive scope.

#### Claims

1. A raised surface fabric knit on a standard terry knitting machine comprising a reverse plaited fabric

construction having loop yarns plaited around stitch yarns, the loop yarns defined by alternating courses of two types of yarns of different colour or dyeability one of said yarns having a shrinkability greater than that of the other of said yarns;

wherein said fabric construction comprises a technical face and a technical back, the fabric construction having been treated to shrink the said one of said loop yarns and the technical back of the fabric construction being raised such that the colour visible on said technical back is essentially provided by said other of said loop yarns whereas the colour visible on the technical face is essentially provided by both of said loop yarns.

2. A fabric as claimed in Claim 1 characterised in that said one of the yarns has a shrinkability of at least 10 percent greater than that of said other of said yarns.
3. A fabric as claimed in Claim 1 or Claim 2 characterised in that said one of said yarns has a shrinkability of between about 10 and 60 percent.
4. A fabric as claimed in any one of the preceding claims characterised in that said other of said yarns has a shrinkability of between about 0 and 10 percent.
5. A fabric as claimed in any one of the preceding claims characterised in that said other of said yarns is made from any one of a flat filament yarn and a spun yarn.
6. A fabric as claimed in any one of the preceding claims characterised in that said other of said yarns is made from any one of a texturised filament yarn and a flat filament yarn.
7. A fabric as claimed in any one of the preceding claims characterised in that said other of said yarns is made from a material selected from any natural material, rayon, acetate, polyester, acrylic and nylon.
8. A fabric as claimed in any one of the preceding claims characterised in that said one of said yarns is made from a different coloured yarn than that of said other of said yarns.
9. A fabric as claimed in any one of the preceding claims characterised in that said one of said yarns is made from yarn of different dyeability than that of said other of said yarns.
10. A fabric as claimed in any one of the preceding claims characterised in that the stitch yarn includes up to 75% Spandex.

11. A fabric as claimed in any one of the preceding claims characterised in that said fabric construction is solely knit stitch.
12. A fabric as claimed in any one of the preceding claims characterised in that said fabric construction is both knit stitch and tuck stitch. 5
13. A method for constructing a raised surface fabric knit comprising the steps of: 10
- producing a reverse plaited fabric construction on a standard terry knitting machine having a face and a back and made from loop yarns plaited around stitch yarns in which there are alternating courses of two different loop yarns, one of said yarns having a shrinkability higher than that of the other of said loop yarns; 15
- applying heat to said fabric construction; 20
- raising the yarns on said technical back of said fabric construction such that only said one of said yarns having low shrinkability is visible; 25
- and raising the yarns on said technical face of said fabric construction such that a blend of said one and said other of said yarns is visible.
14. A method as claimed in Claim 13 characterised in that heat is applied at a temperature of at least 93°C (200°F). 30
15. A method as claimed in Claim 13 or Claim 14 characterised in that the raising of said yarns is achieved by any one of the processes of napping, brushing and sanding. 35
16. A method as claimed in any one of Claims 13 to 15 characterised in that said producing step comprises producing solely a knit stitch reverse plaited fabric construction. 40
17. A method as claimed in any one of Claims 13 to 15 characterised in that said producing step comprises producing a combination knit and tuck stitch reverse plaited fabric construction. 45

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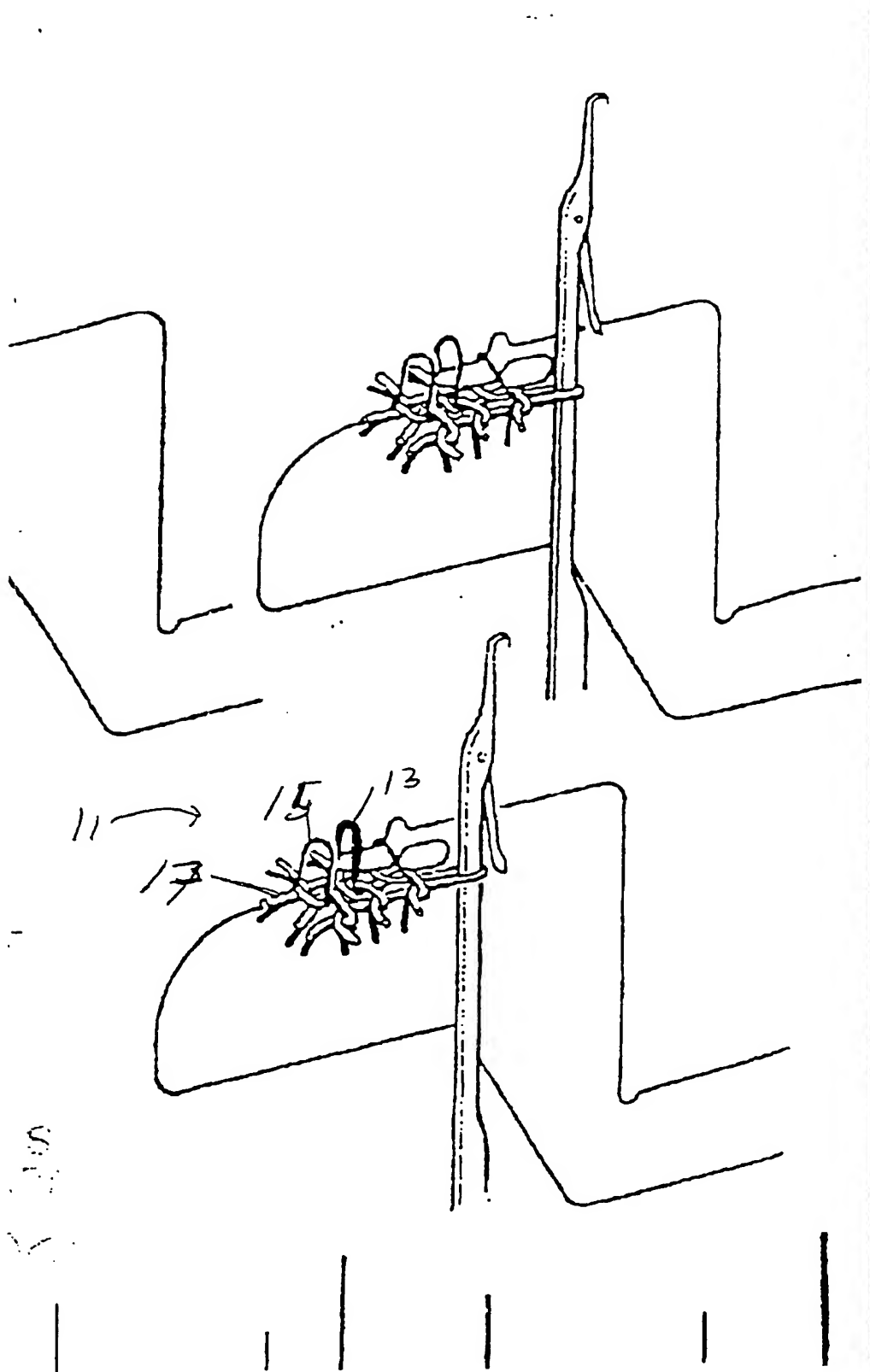
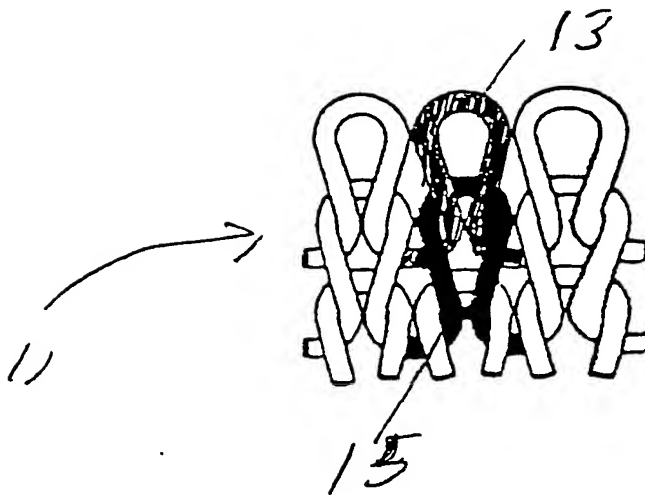


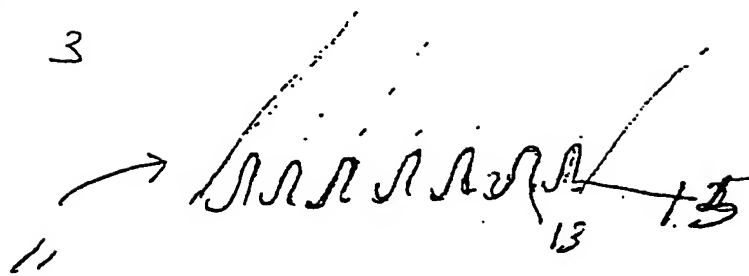
Fig 1

Fig 2



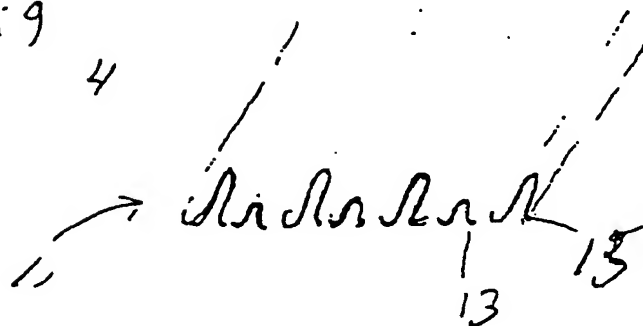
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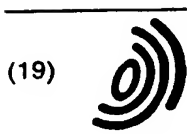
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Fig

4





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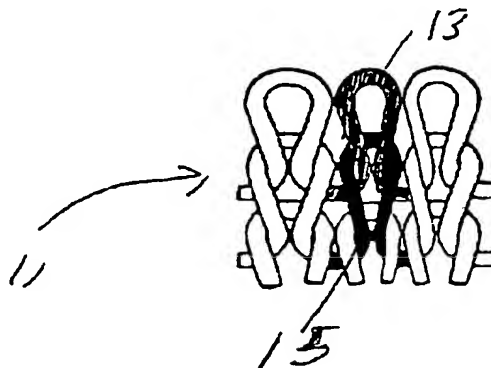
(72) Inventors:  
• Rock, Moshe  
Andover, MA 01810 (US)  
• Lie, William K.  
Methuen, MA 01844 (US)  
• Dionne, Edward P.  
South Paris, ME 04281 (US)

(74) Representative: Colmer, Stephen Gary et al  
Mathys & Squire  
100 Gray's Inn Road  
London WC1X 8AL (GB)

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Fig 2



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## EUROPEAN SEARCH REPORT

Application Number  
EP 98 30 8622

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	FR 1 175 872 A (SOCIÉTÉ RHOVYL) 2 April 1959 (1959-04-02) * page 1, left-hand column, line 17 - right-hand column, line 19 *	1,5,7,8, 11,13-15	D04B1/04
A	WO 87 06960 A (MOORE) 19 November 1987 (1987-11-19) * page 8, line 6 - page 11, line 6 *	1,7,10	
A	WO 98 26119 A (TEIJIN LTD) 18 June 1998 (1998-06-18)		
A	GB 2 151 269 A (MOORE) 17 July 1985 (1985-07-17)		
A	GB 1 167 047 A (KUNSTSEIDEN-AG) 15 October 1969 (1969-10-15)		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			D04B
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>24 November 2000</b>	Examiner <b>Van Gelder, P</b>
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EPO FORM 1503 D3 82 (Rev.01)



ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 98 30 8622

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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24-11-2000

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
FR 1175872	A	02-04-1959	NONE		
WO 8706960	A	19-11-1987	AT	68021 T	15-10-1991
			AU	603072 B	08-11-1990
			AU	6576086 A	12-11-1987
			CA	1303866 A	23-06-1992
			DE	3773463 A	07-11-1991
			DE	3773463 D	07-11-1991
			EP	0267222 A	18-05-1988
			US	4998419 A	12-03-1991
WO 9826119	A	18-06-1998	JP	10168704 A	23-06-1998
			CN	1215441 A	28-04-1999
			EP	0926284 A	30-06-1999
			US	6076242 A	20-06-2000
GB 2151269	A	17-07-1985	HK	97888 A	09-12-1988
GB 1167047	A	15-10-1969	NONE		